



FIG. 1

FIG. 2

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PAPP-Ea

nt: SEQ ID NO:1

aa: SEQ ID NO:3

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ccccaaagcatcaaactgaaggaaacattctaaccttcacagacagactggag 52
gctggatggggacctggctgaagacatctggagaatgaaagttaagtaccag 104
cttgcatttttgtgcccctagattattttgcatttttaaataagaagcatc 156
aaattgcggtgtctctgtgtaaaagttctagcaatttgttttaagggtgaactt 208
attttggcttagggactacaaaaagagaaggtaattcctaggggaaggaagaa 260
gagaaagaaatgaaaattagagaataagattattttgaatgacttcaggtag 312
cgaggagtgtgtgtttgtgagtgtgtatttgagagacttggctcatgcctgt 364
gggtcttctcttctagtatcagtgaggggagggattactgaagaagaagggg 416
ggaaaaaaaaaagaaagaaatctgagcttttctgggaggaaattcaaaggaacc 468
aagagaaattaacttcgttctgcaaggactaaagtacagcaagaggagagag 520
gtcaagcgagaagcgtgcgggaagcacatgccctggggaggcatagaagcca 572
cactggcagagcggccagcacaggtagccagcagaggcattcttggggctat 624
ttgaaaaagtttggctctgtgaacaaaacagtttccctggtgactgcaaattcc 676
attgctagctgcctctttctcgtctgcccatactctggtgtggtaccacaga 728
agttgacttctggttctgtagaaagagctaggggaggt  M  M  C  3
                                         ATG ATG TGC 775
L  K  I  L  R  I  S  L  A  I  L  A  G  16
TTA AAG ATC CTA AGA ATA AGC CTG GCG ATT TTG GCT GGG 814
      | -> BEGIN PAPP-Ef CLONE
W  A  L  C  S  A  N  S  E  L  G  W  T  29
TGG GCA CTC TGT TCT GCC AAC TCT GAG CTG GGC TGG ACA 853
      | -> BEGIN PAPP-Ef CLONE
R  K  K  S  L  V  E  R  E  H  L  N  Q  42
CGC AAG AAA TCC TTG GTT GAG AGG GAA CAC CTG AAT CAG 892
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FIG. 3A

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V	L	L	E	G	E	R	C	W	L	G	A	K	55
GTG	CTG	TTG	GAA	GGA	GAA	CGT	TGT	TGG	CTG	GGG	GCC	AAG	931
V	R	R	P	R	A	S	P	Q	H	H	L	F	68
GTT	CGA	AGA	CCC	AGA	GCT	TCT	CCA	CAG	CAT	CAC	CTC	TTT	970
G	V	Y	P	S	R	A	G	N	Y	L	R	P	81
GGA	GTC	TAC	CCC	AGC	AGG	GCT	GGG	AAC	TAC	CTA	AGG	CCC	1009
Y	P	V	G	E	Q	E	I	H	H	T	G	R	94
TAC	CCC	GTG	GGG	GAG	CAA	GAA	ATC	CAT	CAT	ACA	GGA	CGC	1048
S	K	P	D	T	E	G	N	A	V	S	L	V	107
AGC	AAA	CCA	GAC	ACT	GAA	GGA	AAT	GCT	GTG	AGC	CTT	GTT	1087
P	P	D	L	T	E	N	P	A	G	L	R	G	120
CCC	CCA	GAC	CTG	ACT	GAA	AAT	CCA	GCA	GGA	CTG	AGG	GGT	1126
A	V	E	E	P	A	A	P	W	V	G	D	S	133
GCA	GTT	GAA	GAG	CCG	GCT	GCC	CCA	TGG	GTA	GGG	GAT	AGT	1165
P	I	G	Q	S	E	L	L	G	D	D	D	A	146
CCT	ATT	GGG	CAA	TCT	GAG	CTG	CTG	GGA	GAT	GAT	GAC	GCT	1204
Y	L	G	N	O	R	S	K	E	S	L	G	E	159
TAT	CTC	GGC	AAT	CAA	AGA	TCC	AAG	GAG	TCT	CTA	GGT	GAG	1243
A	G	I	Q	K	G	S	A	→ BEGIN PAPP-Ef TRANSLATION					
GCC	GGG	ATT	CAG	AAA	GGC	TCA	GCC	M	A	A	T	T	172
								ATG	GCT	GCC	ACT	ACT	1282
								→ BEGIN PAPP-Ef TRANSLATION					
T	T	A	I	F	T	T	L	N	E	P	K	P	185
ACC	ACC	GCC	ATT	TTC	ACA	ACC	CTG	AAC	GAA	CCC	AAA	CCA	1321
E	T	Q	R	R	G	W	A	K	S	R	Q	R	198
GAG	ACC	CAA	AGG	AGG	GGC	TGG	GCC	AAG	TCC	AGG	CAG	CGT	1360
R	Q	V	W	K	R	R	A	E	D	G	Q	G	211
CGC	CAA	GTG	TGG	AAG	AGG	CGG	GCG	GAA	GAT	GGG	CAG	GGA	1399
D	S	G	I	S	S	H	F	Q	P	W	P	K	224
GAC	TCC	GGT	ATC	TCT	TCA	CAT	TTC	CAA	CCT	TGG	CCC	AAG	1438
H	S	L	K	H	R	V	K	K	S	P	P	E	237
CAT	TCC	CTT	AAA	CAC	AGG	GTC	AAA	AAG	AGT	CCA	CCG	GAG	1477
E	S	N	Q	N	G	G	E	G	S	Y	R	E	250

FIG. 3B

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GAA	AGC	AAC	CAA	AAT	GGT	GGA	GAG	GGC	TCC	TAC	CGA	GAA	1516
A	E	T	F	N	S	Q	V	G	L	P	I	L	263
GCA	GAG	ACC	TTT	AAG	TCC	CAA	GTA	GGA	CTG	CCC	ATC	TTA	1555
Y	F	S	G	R	R	E	R	L	L	L	R	P	276
TAC	TTC	TCT	GGG	AGG	CGG	GAG	CGG	CTG	CTG	CTG	CGT	CCA	1594
E	V	L	A	E	I	P	R	E	A	F	T	V	289
GAA	GTG	CTG	GCT	GAG	ATT	CCC	CGG	GAG	GCG	TTC	ACA	GTG	1633
E	A	W	V	K	P	E	G	G	Q	N	N	P	302
GAA	GCC	TGG	GTT	AAA	CCG	GAG	GGA	GGA	CAG	AAC	AAC	CCA	1672
A	I	I	A	G	V	F	D	N	C	S	H	T	315
GCC	ATC	ATC	GCA	GGT	GTG	TTT	GAT	AAC	TGC	TCC	CAC	ACT	1711
V	S	D	K	G	W	A	L	G	I	R	S	G	328
GTC	AGT	GAC	AAA	GGC	TGG	GCC	CTG	GGG	ATC	CGC	TCA	GGG	1750
K	D	K	G	K	R	D	A	R	F	F	F	S	341
AAG	GAC	AAG	GGA	AAG	CGG	GAT	GCT	CGC	TTC	TTC	TTC	TCC	1789
L	C	T	D	R	V	K	K	A	T	I	L	I	354
CTC	TGC	ACC	GAC	CGC	GTG	AAG	AAA	GCC	ACC	ATC	TTG	ATT	1828
S	H	S	R	Y	Q	P	G	T	W	T	H	V	367
AGC	CAC	AGT	CGC	TAC	CAA	CCA	GGC	ACA	TGG	ACC	CAT	GTG	1867
A	A	T	Y	D	G	R	H	M	A	L	Y	V	380
GCA	GCC	ACT	TAC	GAT	GGA	CGG	CAC	ATG	GCC	CTG	TAT	GTG	1906
D	G	T	Q	V	A	S	S	L	D	O	S	G	393
GAT	GGC	ACT	CAG	GTG	GCT	AGC	AGT	CTA	GAC	CAG	TCT	GGT	1945
P	L	N	S	P	F	M	A	S	C	R	S	L	406
CCC	CTG	AAC	AGC	CCC	TTC	ATG	GCA	TCT	TGC	CGC	TCT	TTG	1984
L	L	G	G	D	S	S	E	D	G	H	Y	F	419
CTC	CTG	GGG	GGA	GAC	AGC	TCT	GAG	GAT	GGG	CAC	TAT	TTC	2023
R	G	H	L	G	T	L	V	F	W	S	T	A	432
CGT	GGA	CAC	CTG	GGC	ACA	CTG	GTT	TTC	TGG	TCG	ACC	GCC	2062
L	P	Q	S	H	F	Q	H	S	S	Q	H	S	445
CTG	CCA	CAA	AGC	CAT	TTT	CAG	CAC	AGT	TCT	CAG	CAT	TCA	2101
S	E	E	E	E	A	T	D	L	V	L	T	A	458
AGT	GAG	GAG	GAG	GAA	GCG	ACT	GAC	TTG	GTC	CTG	ACA	GCG	2140

FIG. 3C

S	F	E	P	V	N	T	E	W	V	P	F	R	471
AGC	TTT	GAG	CCT	GTG	AAC	ACA	GAG	TGG	GTT	CCC	TTT	AGA	2179
D	E	K	Y	P	R	L	E	V	L	Q	G	F	484
GAT	GAG	AAG	TAC	CCA	CGA	CTT	GAG	GTT	CTC	CAG	GGC	TTT	2218
E	P	E	P	E	I	L	S	P	L	Q	P	P	497
GAG	CCA	GAG	CCT	GAG	ATT	CTG	TCG	CCT	TTG	CAG	CCC	CCA	2257
L	C	G	Q	T	V	C	D	N	V	E	L	I	510
CTC	TGT	GGG	CAA	ACA	GTC	TGT	GAC	AAT	GTG	GAA	TTG	ATC	2296
S	Q	Y	N	G	Y	W	P	L	R	G	E	K	523
TCC	CAG	TAC	AAT	GGA	TAC	TGG	CCC	CTT	CGG	GGA	GAG	AAG	2335
V	I	R	Y	Q	V	V	N	I	C	D	D	E	536
GTG	ATA	CGC	TAC	CAG	GTG	GTG	AAC	ATC	TGT	GAT	GAT	GAG	2374
G	L	N	P	I	V	S	E	E	Q	I	R	L	549
GGC	CTA	AAC	CCC	ATT	GTG	AGT	GAG	GAG	CAG	ATT	CGT	CTG	2413
Q	H	E	A	L	N	E	A	F	S	R	Y	N	562
CAG	CAC	GAG	GCA	CTG	AAT	GAG	GCC	TTC	AGC	CGC	TAC	AAC	2452
I	S	W	Q	L	S	V	H	Q	V	H	N	S	575
ATC	AGC	TGG	CAG	CTG	AGC	GTC	CAC	CAG	GTC	CAC	AAT	TCC	2491
T	L	R	H	R	V	V	L	V	N	C	E	P	588
ACC	CTG	CGA	CAC	CGG	GTT	GTG	CTT	GTG	AAC	TGT	GAG	CCC	2530
S	K	I	G	N	D	H	C	D	P	E	C	E	601
AGC	AAG	ATT	GGC	AAT	GAC	CAT	TGT	GAC	CCC	GAG	TGT	GAG	2569
H	P	L	T	G	Y	D	G	G	D	C	R	L	614
CAC	CCA	CTC	ACA	GGC	TAT	GAT	GGG	GGT	GAC	TGC	CGC	CTG	2608
Q	G	R	C	Y	S	W	N	R	R	D	G	L	627
CAG	GGC	CGC	TGC	TAC	TCC	TGG	AAC	CGC	AGG	GAT	GGG	CTC	2647
C	H	V	E	C	N	N	M	L	N	D	F	D	640
TGT	CAC	GTG	GAG	TGT	AAC	AAC	ATG	CTG	AAC	GAC	TTT	GAC	2686
D	G	D	C	C	D	P	Q	V	A	D	V	R	653
GAC	GGA	GAC	TGC	TGC	GAC	CCC	CAG	GTG	GCT	GAT	GTG	CGC	2725
K	T	C	F	D	P	D	S	P	K	R	A	Y	666
AAG	ACC	TGC	TTT	GAC	CCT	GAC	TCA	CCC	AAG	AGG	GCA	TAC	2764

FIG. 3D

M	S	V	K	E	L	K	E	A	L	Q	L	N	679
ATG	AGT	GTG	AAG	GAG	CTG	AAG	GAG	GCC	CTG	CAG	CTG	AAC	2803
S	T	H	F	L	N	I	Y	F	A	S	S	V	692
AGT	ACT	CAC	TTC	CTC	AAC	ATC	TAC	TTT	GCC	AGC	TCA	GTG	2842
R	E	D	L	A	G	A	A	T	W	P	W	D	705
CGG	GAA	GAC	CTT	GCA	GGT	GCT	GCC	ACC	TGG	CCT	TGG	GAC	2881
K	D	A	V	T	H	L	G	G	I	V	L	S	718
AAG	GAC	GCT	GTC	ACT	CAC	CTG	GGT	GGC	ATT	GTC	CTC	AGC	2920
P	A	Y	Y	G	M	P	G	H	T	D	T	M	731
CCA	GCA	TAT	TAT	GGG	ATG	CCT	GGC	CAC	ACC	GAC	ACC	ATG	2959
I	H	E	V	G	H	V	L	G	L	Y	H	V	744
ATC	CAT	GAA	GTG	GGA	CAT	GTT	CTG	GGA	CTC	TAC	CAT	GTC	2998
F	K	G	V	S	E	R	E	S	C	N	D	P	757
TTT	AAA	GGA	GTC	AGT	GAA	AGA	GAA	TCC	TGC	AAT	GAC	CCC	3037
C	K	E	T	V	P	S	M	E	T	G	D	L	770
TGC	AAG	GAG	ACA	GTG	CCA	TCC	ATG	GAA	ACG	GGA	GAC	CTC	3076
C	A	D	T	A	P	T	P	K	S	E	L	C	783
TGT	GCC	GAC	ACC	GCC	CCC	ACT	CCC	AAG	AGT	GAG	CTG	TGC	3115
R	E	P	E	P	T	S	D	T	C	G	F	T	796
CGG	GAA	CCA	GAG	CCC	ACT	AGT	GAC	ACC	TGT	GGC	TTC	ACT	3154
R	F	P	G	A	P	F	T	N	Y	M	S	Y	809
CGC	TTC	CCA	GGG	GCT	CCG	TTC	ACC	AAC	TAC	ATG	AGC	TAC	3193
T	D	D	N	C	T	D	N	F	T	P	N	Q	822
ACG	GAT	GAT	AAC	TGC	ACT	GAC	AAC	TTC	ACT	CCT	AAC	CAA	3232
V	A	R	M	H	C	Y	L	D	L	V	Y	Q	835
GTG	GCC	CGA	ATG	CAT	TGC	TAT	TTG	GAC	CTA	GTC	TAT	CAG	3271
Q	W	T	E	S	R	K	P	T	P	I	P	I	848
CAG	TGG	ACT	GAA	AGC	AGA	AAG	CCC	ACC	CCC	ATC	CCC	ATT	3310
P	P	M	V	I	G	Q	T	N	K	S	L	T	861
CCA	CCT	ATG	GTC	ATC	GGA	CAG	ACC	AAC	AAG	TCC	CTC	ACT	3349
I	H	W	L	P	P	I	S	G	V	V	Y	D	874
ATC	CAC	TGG	CTG	CCT	CCT	ATT	AGT	GGA	GTT	GTA	TAT	GAC	3388
R	A	S	G	S	L	C	G	A	C	T	E	D	887

FIG. 3E

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AGG	GCC	TCA	GGC	AGC	TTG	TGT	GGC	GCT	TGC	ACT	GAA	GAT	3427
G	T	F	R	Q	Y	V	H	T	A	S	S	R	900
GGG	ACC	TTT	CGT	CAG	TAT	GTG	CAC	ACA	GCT	TCC	TCC	CGG	3466
R	V	C	D	S	S	G	Y	W	T	P	E	E	913
CGG	GTG	TGT	GAC	TCC	TCA	GGT	TAT	TGG	ACC	CCA	GAG	GAG	3505
A	V	G	P	P	D	V	D	Q	P	C	E	P	926
GCT	GTG	GGG	CCT	CCT	GAT	GTG	GAT	CAG	CCC	TGC	GAG	CCA	3544
S	L	Q	A	W	S	P	E	V	H	L	Y	H	939
AGC	TTA	CAG	GCC	TGG	AGC	CCT	GAG	GTC	CAC	CTG	TAC	CAC	3583
M	N	M	T	V	P	C	P	T	E	G	C	S	952
ATG	AAC	ATG	ACG	GTC	CCC	TGC	CCC	ACA	GAA	GGC	TGT	AGC	3622
L	E	L	L	F	Q	H	P	V	Q	A	D	T	965
TTG	GAG	CTG	CTC	TTC	CAA	CAC	CCG	GTC	CAA	GCC	GAC	ACC	3661
L	T	L	W	V	T	S	F	F	M	E	S	S	978
CTC	ACC	CTG	TGG	GTC	ACT	TCC	TTC	TTC	ATG	GAG	TCC	TCG	3700
Q	V	L	F	D	T	E	I	L	L	E	N	K	991
CAG	GTC	CTC	TTT	GAC	ACA	GAG	ATC	TTG	CTG	GAA	AAC	AAG	3739
E	S	V	H	L	G	P	L	D	T	F	C	D	1004
GAG	TCA	GTG	CAC	CTG	GGC	CCC	TTA	GAC	ACT	TTC	TGT	GAC	3778
I	P	L	T	I	K	L	H	V	D	G	K	V	1017
ATC	CCA	CTC	ACC	ATC	AAA	CTG	CAC	GTG	GAT	GGG	AAG	GTG	3817
S	G	V	K	V	Y	T	F	D	E	R	I	E	1030
TCG	GGG	GTG	AAA	GTC	TAC	ACC	TTT	GAT	GAG	AGG	ATA	GAG	3856
I	D	A	A	L	L	T	S	Q	P	H	S	P	1043
ATT	GAT	GCA	GCA	CTC	CTG	ACT	TCT	CAG	CCC	CAC	AGT	CCC	3895
L	C	S	G	C	R	P	V	R	Y	Q	V	L	1056
TTG	TGC	TCT	GGC	TGC	AGG	CCT	GTG	AGG	TAC	CAG	GTT	CTC	3934
R	D	P	P	F	A	S	G	L	P	V	V	V	1069
CGC	GAT	CCC	CCA	TTT	GCC	AGT	GGT	TTG	CCC	GTG	GTG	GTG	3973
T	H	S	H	R	K	F	T	D	V	E	V	T	1082
ACA	CAT	TCT	CAC	AGG	AAG	TTC	ACG	GAC	GTG	GAG	GTC	ACA	4012
P	G	Q	M	Y	Q	Y	Q	V	L	A	E	A	1095
CCT	GGA	CAG	ATG	TAT	CAG	TAC	CAA	GTT	CTA	GCT	GAA	GCT	4051

FIG. 3F



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G	G	E	L	G	E	A	S	P	P	L	N	H	1108
GGA	GGA	GAA	CTG	GGA	GAA	GCT	TCG	CCT	CCT	CTG	AAC	CAC	4090
I	H	G	A	P	Y	C	G	D	G	K	V	S	1121
ATT	CAT	GGA	GCT	CCT	TAT	TGT	GGA	GAT	GGG	AAG	GTG	TCA	4129
E	R	L	G	E	E	C	D	D	G	D	L	V	1134
GAG	AGA	CTG	GGA	GAA	GAG	TGT	GAT	GAT	GGA	GAC	CTT	GTG	4168
S	G	D	G	C	S	K	V	C	E	L	E	E	1147
AGC	GGA	GAT	GGC	TGC	TCC	AAG	GTG	TGT	GAG	CTG	GAG	GAA	4207
G	F	N	C	V	G	E	P	S	L	C	Y	M	1160
GGT	TTC	AAC	TGT	GTA	GGA	GAG	CCA	AGC	CTT	TGC	TAC	ATG	4246
Y	E	G	D	G	I	C	E	P	F	E	R	K	1173
TAT	GAG	GGA	GAT	GGC	ATA	TGT	GAA	CCT	TTT	GAG	AGA	AAA	4285
T	S	I	V	D	C	G	I	Y	T	P	K	G	1186
ACC	AGC	ATT	GTA	GAC	TGT	GGC	ATC	TAC	ACT	CCC	AAA	GGA	4324
Y	L	D	Q	W	A	T	R	A	Y	S	S	H	1199
TAC	TTG	GAT	CAA	TGG	GCT	ACC	CGG	GCT	TAC	TCC	TCT	CAT	4363
E	D	K	K	K	C	P	V	S	L	V	T	G	1212
GAA	GAC	AAG	AAG	AAG	TGT	CCT	GTT	TCC	TTG	GTA	ACT	GGA	4402
E	P	H	S	L	I	C	T	S	Y	H	P	D	1225
GAA	CCT	CAT	TCC	CTA	ATT	TGC	ACA	TCA	TAC	CAT	CCA	GAT	4441
L	P	N	H	R	P	L	T	G	W	F	P	C	1238
TTA	CCC	AAC	CAC	CGT	CCC	CTA	ACT	GGC	TGG	TTT	CCC	TGT	4480
V	A	S	E	N	E	T	Q	D	D	R	S	E	1251
GTT	GCC	AGT	GAA	AAT	GAA	ACT	CAG	GAT	GAC	AGG	AGT	GAA	4519
Q	P	E	G	S	L	K	K	E	D	E	V	W	1264
CAG	CCA	GAA	GGT	AGC	CTG	AAG	AAA	GAG	GAT	GAG	GTT	TGG	4558
L	K	V	C	F	N	R	P	G	E	A	R	A	1277
CTC	AAA	GTG	TGT	TTC	AAT	AGA	CCA	GGA	GAG	GCC	AGA	GCA	4597
I	F	I	F	L	T	T	D	G	L	V	P	G	1290
ATT	TTT	ATT	TTT	TTG	ACA	ACT	GAT	GGC	CTA	GTT	CCC	GGA	4636
E	H	Q	Q	P	T	V	T	L	Y	L	T	D	1303
GAG	CAT	CAG	CAG	CCG	ACA	GTG	ACT	CTC	TAC	CTG	ACC	GAT	4675

FIG. 3G

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V	R	G	S	N	H	S	L	G	T	Y	G	L	1316
GTC	CGT	GGA	AGC	AAC	CAC	TCT	CTT	GGA	ACC	TAT	GGA	CTG	4714
S	C	Q	H	N	P	L	I	I	N	V	T	H	1329
TCA	TGC	CAG	CAT	AAT	CCA	CTG	ATT	ATC	AAT	GTG	ACC	CAT	4753
H	Q	N	V	L	F	H	H	T	T	S	V	L	1342
CAC	CAG	AAT	GTC	CTT	TTC	CAC	CAT	ACC	ACC	TCA	GTG	CTG	4792
P	N	F	S	S	P	R	V	G	I	S	A	V	1355
CCG	AAT	TTC	TCA	TCC	CCA	CGG	GTC	GGC	ATC	TCA	GCT	GTG	4831
A	L	R	T	S	S	R	I	G	L	S	A	P	1368
GCT	CTA	AGG	ACA	TCC	TCC	CGC	ATT	GGT	CTT	TCG	GCT	CCC	4870
S	N	C	I	S	E	D	E	G	Q	N	H	Q	1381
AGT	AAC	TGC	ATC	TCA	GAG	GAC	GAG	GGG	CAG	AAT	CAT	CAG	4909
G	Q	S	C	I	H	R	P	C	G	K	Q	D	1394
GGA	CAG	AGC	TGT	ATC	CAT	CGG	CCC	TGT	GGG	AAG	CAG	GAC	4948
S	C	P	S	L	L	L	D	H	A	D	V	V	1407
AGC	TGT	CCG	TCA	TTG	CTG	CTT	GAT	CAT	GCT	GAT	GTG	GTG	4987
N	C	T	S	I	G	P	G	L	M	K	C	A	1420
AAC	TGT	ACC	TCT	ATA	GGC	CCA	GGT	CTC	ATG	AAG	TGT	GCT	5026
I	T	C	Q	R	G	F	A	L	Q	A	S	S	1433
ATC	ACT	TGT	CAA	AGG	GGA	TTT	GCC	CTT	CAG	GCC	AGC	AGT	5065
G	Q	Y	I	R	P	M	Q	K	E	I	L	L	1446
GGG	CAG	TAC	ATC	AGG	CCC	ATG	CAG	AAG	GAA	ATT	CTG	CTC	5104
T	C	S	S	G	H	W	D	Q	N	V	S	C	1459
ACA	TGT	TCT	TCT	GGG	CAC	TGG	GAC	CAG	AAT	GTG	AGC	TGC	5143
L	P	V	D	C	G	V	P	D	P	S	L	V	1472
CTT	CCC	GTG	GAC	TGC	GGT	GTT	CCC	GAC	CCG	TCT	TTG	GTG	5182
N	Y	A	N	F	S	C	S	E	G	T	K	F	1485
AAC	TAT	GCA	AAC	TTC	TCC	TGC	TCA	GAG	GGA	ACC	AAA	TTT	5221
L	K	R	C	S	I	S	C	V	P	P	A	K	1498
CTG	AAA	CGC	TGC	TCA	ATC	TCT	TGT	GTC	CCA	CCA	GCC	AAG	5260
L	Q	G	L	S	P	W	L	T	C	L	E	D	1511
CTG	CAA	GGA	CTG	AGC	CCA	TGG	CTG	ACA	TGT	CTT	GAA	GAT	5299
G	L	W	S	L	P	E	V	Y	C	K	L	E	1524

FIG. 3H

GGT	CTC	TGG	TCT	CTC	CCT	GAA	GTC	TAC	TGC	AAG	TTG	GAG	5338
C	D	A	P	P	I	I	L	N	A	N	L	L	1537
TGT	GAT	GCT	CCC	CCT	ATT	ATT	CTG	ATT	GCC	AAC	TTG	CTC	5377
L	P	H	C	L	Q	D	N	H	D	V	G	T	1550
CTG	CCT	CAC	TGC	CTC	CAG	GAC	AAC	CAC	GAC	GTG	GGC	ACC	5416
I	C	K	Y	E	C	K	P	G	Y	Y	V	A	1563
ATC	TGC	AAA	TAT	GAA	TGC	AAA	CCA	GGG	TAC	TAT	GTG	GCA	5455
E	S	A	E	G	K	V	R	N	K	L	L	K	1576
GAA	AGT	GCA	GAG	GGT	AAA	GTC	AGG	AAC	AAG	CTC	CTG	AAG	5494
I	Q	C	L	E	G	G	I	W	E	Q	G	S	1589
ATA	CAA	TGC	CTG	GAA	GGT	GGA	ATC	TGG	GAG	CAA	GGC	AGC	5533
C	I	P	V	V	C	E	P	P	P	P	V	F	1602
TGC	ATT	CCT	GTG	GTG	TGT	GAG	CCA	CCC	CCT	CCT	GTG	TTT	5572
E	G	M	Y	E	C	T	N	G	F	S	L	D	1615
GAA	GGC	ATG	TAT	GAA	TGT	ACC	AAT	GGC	TTC	AGC	CTG	GAC	5611
S	Q	C	V	L	N	C	N	Q	E	R	E	K	1628
AGC	CAG	TGT	GTG	CTC	AAC	TGT	AAC	CAG	GAA	CGT	GAA	AAG	5650
L	P	I	L	C	T	K	E	G	L	W	T	Q	1641
CTT	CCC	ATC	CTC	TGC	ACT	AAA	GAG	GGC	CTG	TGG	ACC	CAG	5689
E	F	K	L	C	E	N	L	Q	G	E	C	P	1654
GAG	TTT	AAG	TTG	TGT	GAG	ATT	CTG	CAA	GGA	GAA	TGC	CCA	5728
P	P	P	S	E	L	N	S	V	E	Y	K	C	1667
CCA	CCC	CCC	TCA	GAG	CTG	AAT	TCT	GTG	GAG	TAC	AAA	TGT	5767
E	Q	G	Y	G	I	G	A	V	C	S	P	L	1680
GAA	CAA	GGA	TAT	GGG	ATT	GGT	GCA	GTG	TGT	TCC	CCA	TTG	5806
C	V	I	P	P	S	D	P	V	M	L	P	E	1693
TGT	GTA	ATC	CCC	CCC	AGT	GAC	CCC	GTG	ATG	CTA	CCT	GAG	5845
N	I	T	A	D	T	L	E	H	W	M	E	P	1706
AAT	ATC	ACT	GCT	GAC	ACT	CTG	GAG	CAC	TGG	ATG	GAA	CCT	5884
V	K	V	Q	S	I	V	C	T	G	R	R	Q	1719
GTC	AAA	GTC	CAG	AGC	ATT	GTG	TGC	ACT	GGC	CGG	CGT	CAA	5923
W	H	P	D	P	V	L	V	H	C	I	Q	S	1732
TGG	CAC	CCA	GAC	CCC	GTC	TTA	GTC	CAC	TGC	ATC	CAG	TCA	5962

FIG. 3I

C	E	P	F	Q	A	N	G	W	C	D	T	I	1745
TGT	GAG	CCC	TTC	CAA	GCA	AAT	GGT	TGG	TGT	GAC	ACT	ATC	6001
N	N	R	A	Y	C	H	Y	D	G	G	D	C	1758
AAC	AAC	CGA	GCC	TAC	TGC	CAC	TAT	GAC	GGG	GGA	GAC	TGC	6040
C	S	S	T	L	S	S	K	K	V	I	P	F	1771
TGC	TCT	TCC	ACA	CTC	TCC	TCC	AAG	AAG	GTC	ATT	CCA	TTT	6079
A	A	D	C	D	L	D	E	C	T	C	R	D	1784
GCT	GCT	GAC	TGT	GAC	CTG	GAT	GAG	TGC	ACC	TGC	CGG	GAC	6118
P	K	A	E	E	N	Q	*						1792
CCC	AAG	GCA	GAA	GAA	AAT	CAG	TAA	ctgtg	ggaacaagcccctc				6161
cctccactgcctcagaggcagtaagaaagagaggccgacccaggaggaaaca													6213
aagggtgaatgaagaagaacaatcatgaaatggaagaaggaggaagagcatg													6265
aaggatcttataagaaatgcaagaggatattgatagggtgtgaactagttcat													6317
caagtagcccaagtaggagagaatcataggcaaaagtttctttaaagtggca													6369
ggtgattaacatggaaggggaaatatgatagatatataaggaccctcc													6421
tcacttataattctattaaatcctatcctcaactcttgccctgctctccgctc													6473
cacccccctgccactactcagtcacccaacttgtaaaccaataacaaaaat													6525
actagaggagaagttggcagggatactgttaatacccatTTTTgaatggattg													6577
ccatctttcagagcttgtctgctctcaactggctctTTTTctTTTTgtgtag													6629
tttccaatgaataatgaagtttagttattaattctttataagtatttaaacad													6681
aattatataaatatattatatattataaaaaaa													6719

FIG. 3J

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PAPP-Eb

nt: SEQ ID NO:8

aa: SEQ ID NO:10

M	M	C	L	K	I	L	R	I	S	L	A	I	13
ATG	ATG	TGC	TTA	AAG	ATC	CTA	AGA	ATA	AGC	CTG	GCG	ATT	39
							→ BEGIN PAPP-Ef CLONE						
L	A	G	W	A	L		C	S	A	N	S	E	26
TTG	GCT	GGG	TGG	GCA	CTC		TGT	TCT	GCC	AAC	TCT	GAG	78
							→ BEGIN PAPP-Ef CLONE						
G	W	T	R	K	K	S	L	V	E	R	E	H	39
GGC	TGG	ACA	CGC	AAG	AAA	TCC	TTG	GTT	GAG	AGG	GAA	CAC	117
L	N	O	V	L	L	E	G	E	R	C	W	L	52
CTG	AAT	CAG	GTG	CTG	TTG	GAA	GGA	GAA	CGT	TGT	TGG	CTG	156
G	A	K	V	R	R	P	R	A	S	P	Q	H	65
GGG	GCC	AAG	GTT	CGA	AGA	CCC	AGA	GCT	TCT	CCA	CAG	CAT	195
H	L	F	G	V	Y	P	S	R	A	G	N	Y	78
CAC	CTC	TTT	GGA	GTC	TAC	CCC	AGC	AGG	GCT	GGG	AAC	TAC	234
L	R	P	Y	P	V	G	E	Q	E	I	H	H	91
CTA	AGG	CCC	TAC	CCC	GTG	GGG	GAG	CAA	GAA	ATC	CAT	CAT	273
T	G	R	S	K	P	D	T	E	G	N	A	V	104
ACA	GGA	CGC	AGC	AAA	CCA	GAC	ACT	GAA	GGA	AAT	GCT	GTG	312
S	L	V	P	P	D	L	T	E	N	P	A	G	117
AGC	CTT	GTT	CCC	CCA	GAC	CTG	ACT	GAA	AAT	CCA	GCA	GGA	351
L	R	G	A	V	E	E	P	A	A	P	W	V	130
CTG	AGG	GGT	GCA	GTT	GAA	GAG	CCG	GCT	GCC	CCA	TGG	GTA	390
G	D	S	P	I	G	Q	S	E	L	L	G	D	143
GGG	GAT	AGT	CCT	ATT	GGG	CAA	TCT	GAG	CTG	CTG	GGA	GAT	429
D	D	A	Y	L	G	N	Q	R	S	K	E	S	156
GAT	GAC	GCT	TAT	CTC	GGC	AAT	CAA	AGA	TCC	AAG	GAG	TCT	468
L	G	E	A	G	I	Q	K	G	S	A	M	A	169
CTA	GGT	GAG	GCC	GGG	ATT	CAG	AAA	GGC	TCA	GCC	ATG	GCT	507
A	T	T	T	T	A	I	F	T	T	L	N	E	182

FIG. 4A

GCC	ACT	ACT	ACC	ACC	GCC	ATT	TTC	ACA	ACC	CTG	AAC	GAA	546
P	K	P	E	T	Q	R	R	G	W	A	K	S	195
CCC	AAA	CCA	GAG	ACC	CAA	AGG	AGG	GGC	TGG	GCC	AAG	TCC	585
R	Q	R	R	Q	V	W	K	R	R	A	E	D	208
AGG	CAG	CGT	CGC	CAA	GTG	TGG	AAG	AGG	CGG	GCG	GAA	GAT	624
G	Q	G	D	S	G	I	S	S	H	F	Q	P	221
GGG	CAG	GGA	GAC	TCC	GGT	ATC	TCT	TCA	CAT	TTC	CAA	CCT	663
W	P	K	H	S	L	K	H	R	V	K	K	S	234
TGG	CCC	AAG	CAT	TCC	CTT	AAA	CAC	AGG	GTC	AAA	AAG	AGT	702
P	P	E	E	S	N	Q	N	G	G	E	G	S	247
CCA	CCG	GAG	GAA	AGC	AAC	CAA	AAT	GGT	GGA	GAG	GGC	TCC	741
Y	R	E	A	E	T	F	N	S	Q	V	G	L	260
TAC	CGA	GAA	GCA	GAG	ACC	TTT	AAC	TCC	CAA	GTA	GGA	CTG	780
P	I	L	Y	F	S	G	R	R	E	R	L	L	273
CCC	ATC	TTA	TAC	TTC	TCT	GGG	AGG	CGG	GAG	CGG	CTG	CTG	819
L	R	P	E	V	L	A	E	I	P	R	E	A	286
CTG	CGT	CCA	GAA	GTG	CTG	GCT	GAG	ATT	CCC	CGG	GAG	GCG	858
F	T	V	E	A	W	V	K	P	E	G	G	Q	299
TTC	ACA	GTG	GAA	GCC	TGG	GTT	AAA	CCG	GAG	GGA	GGA	CAG	897
N	N	P	A	I	I	A	G	V	F	D	N	C	312
AAC	AAC	CCA	GCC	ATC	ATC	GCA	GGT	GTG	TTT	GAT	AAC	TGC	936
S	H	T	V	S	D	K	G	W	A	L	G	I	325
TCC	CAC	ACT	GTC	AGT	GAC	AAA	GGC	TGG	GCC	CTG	GGG	ATC	975
R	S	G	K	D	K	G	K	R	D	A	R	F	338
CGC	TCA	GGG	AAG	GAC	AAG	GGA	AAG	CGG	GAT	GCT	CGC	TTC	1014
F	F	S	L	C	T	D	R	V	K	K	A	T	351
TTC	TTC	TCC	CTC	TGC	ACC	GAC	CGC	GTG	AAG	AAA	GCC	ACC	1053
I	L	I	S	H	S	R	Y	Q	P	G	T	W	364
ATC	TTG	ATT	AGC	CAC	AGT	CGC	TAC	CAA	CCA	GGC	ACA	TGG	1092
T	H	V	A	A	T	Y	D	G	R	H	M	A	377
ACC	CAT	GTG	GCA	GCC	ACT	TAC	GAT	GGA	CGG	CAC	ATG	GCC	1131
L	Y	V	D	G	T	Q	V	A	S	S	L	D	390

FIG. 4B

CTG	TAT	GTG	GAT	GGC	ACT	CAG	GTG	GCT	AGC	AGT	CTA	GAC	1170
Q	S	G	P	L	N	S	P	F	M	A	S	C	403
CAG	TCT	GGT	CCC	CTG	AAC	AGC	CCC	TTC	ATG	GCA	TCT	TGC	1209
R	S	L	L	L	G	G	D	S	S	E	D	G	416
CGC	TCT	TTG	CTC	CTG	GGG	GGA	GAC	AGC	TCT	GAG	GAT	GGG	1248
H	Y	F	R	G	H	L	G	T	L	V	F	W	429
CAC	TAT	TTC	CGT	GGA	CAC	CTG	GGC	ACA	CTG	GTT	TTC	TGG	1287
S	T	A	L	P	Q	S	H	F	Q	H	S	S	442
TCG	ACC	GCC	CTG	CCA	CAA	AGC	CAT	TTT	CAG	CAC	AGT	TCT	1326
Q	H	S	S	E	E	E	E	A	T	D	L	V	455
CAG	CAT	TCA	AGT	GAG	GAG	GAG	GAA	GCG	ACT	GAC	TTG	GTC	1365
L	T	A	S	F	E	P	V	N	T	E	W	V	468
CTG	ACA	GCG	AGC	TTT	GAG	CCT	GTG	AAC	ACA	GAG	TGG	GTT	1404
P	F	R	D	E	K	Y	P	R	L	E	V	L	481
CCC	TTT	AGA	GAT	GAG	AAG	TAC	CCA	CGA	CTT	GAG	GTT	CTC	1443
Q	G	F	E	P	E	P	E	I	L	S	P	L	494
CAG	GGC	TTT	GAG	CCA	GAG	CCT	GAG	ATT	CTG	TCG	CCT	TTG	1482
Q	P	P	L	C	G	Q	T	V	C	D	N	V	507
CAG	CCC	CCA	CTC	TGT	GGG	CAA	ACA	GTC	TGT	GAC	AAT	GTG	1521
E	L	I	S	Q	Y	N	G	Y	W	P	L	R	520
GAA	TTG	ATC	TCC	CAG	TAC	AAT	GGA	TAC	TGG	CCC	CTT	CGG	1560
G	E	K	V	I	R	Y	Q	V	V	N	I	C	533
GGA	GAG	AAG	GTG	ATA	CGC	TAC	CAG	GTG	GTG	AAC	ATC	TGT	1599
D	D	E	G	L	N	P	I	V	S	E	E	Q	546
GAT	GAT	GAG	GGC	CTA	AAC	CCC	ATT	GTG	AGT	GAG	GAG	CAG	1638
I	R	L	Q	H	E	A	L	N	E	A	F	S	559
ATT	CGT	CTG	CAG	CAC	GAG	GCA	CTG	AAT	GAG	GCC	TTC	AGC	1677
R	Y	N	I	S	W	Q	L	S	V	H	Q	V	572
CGC	TAC	AAC	ATC	AGC	TGG	CAG	CTG	AGC	GTC	CAC	CAG	GTC	1716
H	N	S	T	L	R	H	R	V	V	L	V	N	585
CAC	AAT	TCC	ACC	CTG	CGA	CAC	CGG	GTT	GTG	CTT	GTG	AAC	1755
C	E	P	S	K	I	G	N	D	H	C	D	P	598

FIG. 4C

TGT	GAG	CCC	AGC	AAG	ATT	GGC	AAT	GAC	CAT	TGT	GAC	CCC	1794
E	C	E	H	P	L	T	G	Y	D	G	G	D	611
GAG	TGT	GAG	CAC	CCA	CTC	ACA	GGC	TAT	GAT	GGG	GGT	GAC	1833
C	R	L	Q	G	R	C	Y	S	W	N	R	R	624
TGC	CGC	CTG	CAG	GGC	CGC	TGC	TAC	TCC	TGG	AAC	CGC	AGG	1872
D	G	L	C	H	V	E	C	N	N	M	L	N	637
GAT	GGG	CTC	TGT	CAC	GTG	GAG	TGT	AAC	AAC	ATG	CTG	AAC	1911
D	F	D	D	G	D	C	C	D	P	Q	V	A	650
GAC	TTT	GAC	GAC	GGA	GAC	TGC	TGC	GAC	CCC	CAG	GTG	GCT	1950
D	V	R	K	T	C	F	D	P	D	S	P	K	663
GAT	GTG	CGC	AAG	ACC	TGC	TTT	GAC	CCT	GAC	TCA	CCC	AAG	1989
R	A	Y	M	S	V	K	E	L	K	E	A	L	676
AGG	GCA	TAC	ATG	AGT	GTG	AAG	GAG	CTG	AAG	GAG	GCC	CTG	2028
Q	L	N	S	T	H	F	L	N	I	Y	F	A	689
CAG	CTG	AAC	AGT	ACT	CAC	TTC	CTC	AAC	ATC	TAC	TTT	GCC	2067
S	S	V	R	E	D	L	A	G	A	A	T	W	702
AGC	TCA	GTG	CGG	GAA	GAC	CTT	GCA	GGT	GCT	GCC	ACC	TGG	2106
P	W	D	K	D	A	V	T	H	L	G	G	I	715
CCT	TGG	GAC	AAG	GAC	GCT	GTC	ACT	CAC	CTG	GGT	GGC	ATT	2145
V	L	S	P	A	Y	Y	G	M	P	G	H	T	728
GTC	CTC	AGC	CCA	GCA	TAT	TAT	GGG	ATG	CCT	GGC	CAC	ACC	2184
D	T	M	I	H	E	V	G	H	V	L	G	L	741
GAC	ACC	ATG	ATC	CAT	GAA	GTG	GGA	CAT	GTT	CTG	GGA	CTC	2223
Y	H	V	F	K	G	V	S	E	R	E	S	C	754
TAC	CAT	GTC	TTT	AAA	GGA	GTC	AGT	GAA	AGA	GAA	TCC	TGC	2262
N	D	P	C	K	E	T	V	P	S	M	E	T	767
AAT	GAC	CCC	TGC	AAG	GAG	ACA	GTG	CCA	TCC	ATG	GAA	ACG	2301
G	D	L	C	A	D	T	A	P	T	P	K	S	780
GGA	GAC	CTC	TGT	GCC	GAC	ACC	GCC	CCC	ACT	CCC	AAG	AGT	2340
E	L	C	R	E	P	E	P	T	S	D	T	C	793
GAG	CTG	TGC	CGG	GAA	CCA	GAG	CCC	ACT	AGT	GAC	ACC	TGT	2379
G	F	T	R	F	P	G	A	P	F	T	N	Y	806

FIG. 4D



GGC	TTC	ACT	CGC	TTC	CCA	GGG	GCT	CCG	TTC	ACC	AAC	TAC	2418
M	S	Y	T	D	D	N	C	T	D	N	F	T	819
ATG	AGC	TAC	ACG	GAT	GAT	AAC	TGC	ACT	GAC	AAC	TTC	ACT	2457
P	N	Q	V	A	R	M	H	C	Y	L	D	L	832
CCT	AAC	CAA	GTG	GCC	CGA	ATG	CAT	TGC	TAT	TTG	GAC	CTA	2496
V	Y	Q	Q	W	T	E	S	R	K	P	T	P	845
GTC	TAT	CAG	CAG	TGG	ACT	GAA	AGC	AGA	AAG	CCC	ACC	CCC	2535
I	P	I	P	P	M	V	I	G	Q	T	N	K	858
ATC	CCC	ATT	CCA	CCT	ATG	GTC	ATC	GGA	CAG	ACC	AAC	AAG	2574
S	L	T	I	H	W	L	P	P	I	S	G	V	871
TCC	CTC	ACT	ATC	CAC	TGG	CTG	CCT	CCT	ATT	AGT	GGA	GTT	2613
V	Y	D	R	A	S	G	S	L	C	G	A	C	884
GTA	TAT	GAC	AGG	GCC	TCA	GGC	AGC	TTG	TGT	GGC	GCT	TGC	2652
T	E	D	G	T	F	R	Q	Y	V	H	T	A	897
ACT	GAA	GAT	GGG	ACC	TTT	CGT	CAG	TAT	GTG	CAC	ACA	GCT	2691
S	S	R	R	V	C	D	S	S	G	Y	W	T	910
TCC	TCC	CGG	CGG	GTG	TGT	GAC	TCC	TCA	GGT	TAT	TGG	ACC	2730
P	E	E	A	V	G	P	P	D	V	D	Q	P	923
CCA	GAG	GAG	GCT	GTG	GGG	CCT	CCT	GAT	GTG	GAT	CAG	CCC	2769
C	E	P	S	L	Q	A	W	S	P	E	V	H	936
TGC	GAG	CCA	AGC	TTA	CAG	GCC	TGG	AGC	CCT	GAG	GTC	CAC	2808
L	Y	H	M	N	M	T	V	P	C	P	T	E	949
CTG	TAC	CAC	ATG	AAC	ATG	ACG	GTC	CCC	TGC	CCC	ACA	GAA	2847
G	C	S	L	E	L	L	F	Q	H	P	V	Q	962
GGC	TGT	AGC	TTG	GAG	CTG	CTC	TTC	CAA	CAC	CCG	GTC	CAA	2886
A	D	T	L	T	L	W	V	T	S	F	F	M	975
GCC	GAC	ACC	CTC	ACC	CTG	TGG	GTC	ACT	TCC	TTC	TTC	ATG	2925
E	S	S	Q	V	L	F	D	T	E	I	L	L	988
GAG	TCC	TCG	CAG	GTC	CTC	TTT	GAC	ACA	GAG	ATC	TTG	CTG	2964
E	N	K	E	S	V	H	L	G	P	L	D	T	1001
GAA	AAC	AAG	GAG	TCA	GTG	CAC	CTG	GGC	CCC	TTA	GAC	ACT	3003
F	C	D	I	P	L	T	I	K	L	H	V	D	1014

FIG. 4E

TTC	TGT	GAC	ATC	CCA	CTC	ACC	ATC	AAA	CTC	CAC	GTG	GAT	3042
G	K	V	S	G	V	K	V	Y	T	F	D	E	1027
GGG	AAG	GTG	TCG	GGG	GTG	AAA	GTC	TAC	ACC	TTT	GAT	GAG	3081
R	I	E	I	D	A	A	L	L	T	S	Q	P	1040
AGG	ATA	GAG	ATT	GAT	GCA	GCA	CTC	CTG	ACT	TCT	CAG	CCC	3120
H	S	P	L	C	S	G	C	R	P	V	R	Y	1053
CAC	AGT	CCC	TTG	TGC	TCT	GGC	TGC	AGG	CCT	GTG	AGG	TAC	3159
O	V	L	R	D	P	P	F	A	S	G	L	P	1066
CAG	GTT	CTC	CGC	GAT	CCC	CCA	TTT	GCC	AGT	GGT	TTG	CCC	3198
V	V	V	T	H	S	G	R	K	F	T	D	V	1079
GTG	GTG	GTG	ACA	CAT	TCT	CAC	AGG	AAG	TTC	ACG	GAC	GTG	3237
E	V	T	P	G	O	M	Y	Q	Y	Q	V	L	1092
GAG	GTC	ACA	CCT	GGA	CAG	ATG	TAT	CAG	TAC	CAA	GTT	CTA	3276
A	E	A	G	G	E	L	G	E	A	S	P	P	1105
GCT	GAA	GCT	GGA	GGA	GAA	CTG	GGA	GAA	GCT	TCG	CCT	CCT	3315
L	N	H	I	H	G	A	P	Y	C	G	D	G	1118
CTG	AAC	CAC	ATT	CAT	GGA	GCT	CCT	TAT	TGT	GGA	GAT	GGG	3354
K	V	S	E	R	L	G	E	E	C	D	D	G	1131
AAG	GTG	TCA	GAG	AGA	CTG	GGA	GAA	GAG	TGT	GAT	GAT	GGA	3393
D	L	V	S	G	D	G	C	S	K	V	C	E	1144
GAC	CTT	GTG	AGC	GGA	GAT	GGC	TGC	TCC	AAG	GTG	TGT	GAG	3432
L	E	E	G	F	N	C	V	G	E	P	S	L	1157
CTG	GAG	GAA	GGT	TTC	AAC	TGT	GTA	GGA	GAG	CCA	AGC	CTT	3471
C	Y	M	Y	E	G	D	G	I	C	E	P	F	1170
TGC	TAC	ATG	TAT	GAG	GGA	GAT	GGC	ATA	TGT	GAA	CCT	TTT	3510
E	R	K	T	S	I	V	D	C	G	I	Y	T	1183
GAG	AGA	AAA	ACC	AGC	ATT	GTA	GAC	TGT	GGC	ATC	TAC	ACT	3549
P	K	G	Y	L	D	Q	W	A	T	R	A	Y	1196
CCC	AAA	GGA	TAC	TTG	GAT	CAA	TGG	GCT	ACC	CGG	GCT	TAC	3588
S	S	H	E	D	K	K	K	C	P	V	S	L	1209
TCC	TCT	CAT	GAA	GAC	AAG	AAG	AAG	TGT	CCT	GTT	TCC	TTG	3627
V	T	G	E	P	H	S	L	I	C	T	S	Y	1222

FIG. 4F

GTA	ACT	GGA	GAA	CCT	CAT	TCC	CTA	ATT	TGC	ACA	TCA	TAC	3666
H	P	D	L	P	N	H	R	P	L	T	G	W	1235
CAT	CCA	GAT	TTA	CCC	AAC	CAC	CGT	CCC	CTA	ACT	GGC	TGG	3705
F	P	C	V	A	S	E	N	E	T	Q	D	D	1248
TTT	CCC	TGT	GTT	GCC	AGT	GAA	AAT	GAA	ACT	CAG	GAT	GAC	3744
R	S	E	Q	P	E	G	S	L	K	K	E	D	1261
AGG	AGT	GAA	CAG	CCA	GAA	GGT	AGC	CTG	AAG	AAA	GAG	GAT	3783
E	V	W	L	K	V	C	F	N	R	P	G	E	1274
GAG	GTT	TGG	CTC	AAA	GTG	TGT	TTC	AAT	AGA	CCA	GGA	GAG	3822
A	R	A	I	F	I	F	L	T	T	D	G	L	1287
GCC	AGA	GCA	ATT	TTT	ATT	TTT	TTG	ACA	ACT	GAT	GGC	CTA	3861
V	P	G	E	H	O	O	P	T	V	T	L	Y	1300
GTT	CCC	GGA	GAG	CAT	CAG	CAG	CCG	ACA	GTG	ACT	CTC	TAC	3900
L	T	D	V	R	G	S	N	H	S	L	G	T	1313
CTG	ACC	GAT	GTC	CGT	GGA	AGC	AAC	CAC	TCT	CTT	GGA	ACC	3939
Y	G	L	S	C	O	H	N	P	L	I	I	N	1326
TAT	GGA	CTG	TCA	TGC	CAG	CAT	AAT	CCA	CTG	ATT	ATC	AAT	3978
V	T	H	H	Q	N	V	L	F	H	H	T	T	1339
GTG	ACC	CAT	CAC	CAG	AAT	GTC	CTT	TTC	CAC	CAT	ACC	ACC	4017
S	V	L	P	N	F	S	S	P	R	V	G	I	1352
TCA	GTG	CTG	CCG	AAT	TTC	TCA	TCC	CCA	CGG	GTC	GGC	ATC	4056
S	A	V	A	L	R	T	S	S	R	I	G	L	1365
TCA	GCT	GTG	GCT	CTA	AGG	ACA	TCC	TCC	CGC	ATT	GGT	CTT	4095
S	A	P	S	N	C	I	S	E	D	E	G	Q	1378
TCG	GCT	CCC	AGT	AAC	TGC	ATC	TCA	GAG	GAC	GAG	GGG	CAG	4134
N	H	Q	G	Q	S	C	I	H	R	P	C	G	1391
AAT	CAT	CAG	GGA	CAG	AGC	TGT	ATC	CAT	CGG	CCC	TGT	GGG	4173
K	Q	D	S	C	P	S	L	L	L	D	H	A	1404
AAG	CAG	GAC	AGC	TGT	CCG	TCA	TTG	CTG	CTT	GAT	CAT	GCT	4212
D	V	V	N	C	T	S	I	G	P	G	L	M	1417
GAT	GTG	GTG	AAC	TGT	ACC	TCT	ATA	GGC	CCA	GGT	CTC	ATG	4251
K	C	A	I	T	C	Q	R	G	F	A	L	Q	1430

FIG. 4G

AAG	TGT	GCT	ATC	ACT	TGT	CAA	AGG	GGA	TTT	GCC	CTT	CAG	4290
A	S	S	G	Q	Y	I	R	P	M	Q	K	E	1443
GCC	AGC	AGT	GGG	CAG	TAC	ATC	AGG	CCC	ATG	CAG	AAG	GAA	4329
I	L	L	T	C	S	S	G	H	W	D	Q	N	1456
ATT	CTG	CTC	ACA	TGT	TCT	TCT	GGG	CAC	TGG	GAC	CAG	ATT	4368
V	S	C	L	P	V	D	C	G	V	P	D	P	1469
GTG	AGC	TGC	CTT	CCC	GTG	GAC	TGC	GGT	GTT	CCC	GAC	CCG	4407
S	L	V	N	Y	A	N	F	S	C	S	E	G	1482
TCT	TTG	GTG	AAC	TAT	GCA	AAC	TTC	TCC	TGC	TCA	GAG	GGA	4486
T	K	F	L	K	R	C	S	I	S	C	V	P	1495
ACC	AAA	TTT	CTG	AAA	CGC	TGC	TCA	ATC	TCT	TGT	GTC	CCA	4485
P	A	K	L	Q	G	L	S	P	W	L	T	C	1508
CCA	GCC	AAG	CTG	CAA	GGA	CTG	AGC	CCA	TGG	CTG	ACA	TGT	4524
L	E	D	G	L	W	S	L	P	E	V	Y	C	1521
CTT	GAA	GAT	GGT	CTC	TGG	TCT	CTC	CCT	GAA	GTC	TAC	TGC	4563
K	L	E	C	D	A	P	P	I	I	L	N	A	1534
AAG	TTG	GAG	TGT	GAT	GCT	CCC	CCT	ATT	ATT	CTG	AAT	GCC	4602
N	L	L	L	P	H	C	L	Q	D	N	H	D	1547
AAC	TTG	CTC	CTG	CCT	CAC	TGC	CTC	CAG	GAC	AAC	CAC	GAC	4641
V	G	T	I	C	K	Y	E	C	K	P	G	Y	1560
GTG	GGC	ACC	ATC	TGC	AAA	TAT	GAA	TGC	AAA	CCA	GGG	TAC	4680
Y	V	A	E	S	A	E	G	K	V	R	N	K	1573
TAT	GTG	GCA	GAA	AGT	GCA	GAG	GGT	AAA	GTC	AGG	AAC	AAG	4719
L	L	K	I	Q	C	L	E	G	G	I	W	E	1586
CTC	CTG	AAG	ATA	CAA	TGC	CTG	GAA	GGT	GGA	ATC	TGG	GAG	4758
Q	G	S	C	I	P	V	V	C	E	P	P	P	1599
CAA	GGC	AGC	TGC	ATT	CCT	GTG	GTG	TGT	GAG	CCA	CCC	CCT	4797
P	V	F	E	G	M	Y	E	C	T	N	G	F	1612
CCT	GTG	TTT	GAA	GGC	ATG	TAT	GAA	TGT	ACC	AAT	GGC	TTC	4836
S	L	D	S	Q	C	V	L	N	C	N	Q	E	1625
AGC	CTG	GAC	AGC	CAG	TGT	GTG	CTC	AAC	TGT	AAC	CAG	AAA	4875
R	E	K	L	P	I	L	C	T	K	E	G	L	1638

FIG. 4H

CGT	GAA	AAG	CTT	CCC	ATC	CTC	TGC	ACT	AAA	GAG	GGC	CTG	4914
W	T	Q	E	F	K	L	C	E	N	L	Q	G	1651
TGG	ACC	CAG	GAG	TTT	AAG	TTG	TGT	GAG	AAT	CTG	CAA	GGA	4953
E	C	P	P	P	P	S	E	L	N	S	V	E	1664
GAA	TGC	CCA	CCA	CCC	CCC	TCA	GAG	CTG	AAT	TCT	GTG	GAG	4992
Y	K	C	X	Q	G	Y	G	I	G	A	V	C	1677
TAC	AAA	TGT	GAR	CAA	GGA	TAT	GGG	ATT	GGT	GCA	GTG	TGT	5031
S	P	L	C	V	I	P	P	S	D	P	V	M	1690
TCC	CCA	TTG	TGT	GTA	ATC	CCC	CCC	AGT	GAC	CCC	GTG	ATG	5070
L	P	E	N	I	T	A	D	T	L	E	H	W	1703
CTA	CCT	GAG	AAT	ATC	ACT	GCT	GAC	ACT	CTG	GAG	CAC	TGG	5109
M	E	P	V	K	V	Q	S	I	V	C	T	G	1716
ATG	GAA	CCT	GTC	AAA	GTC	CAG	AGC	ATT	GTG	TGC	ACT	GGC	5148
R	R	Q	W	H	P	D	P	V	L	V	H	C	1729
CGG	CGT	CAA	TGG	CAC	CCA	GAC	CCC	GTC	TTA	GTC	CAC	TGC	5187
→ EXON 21													
I	Q	S	C	E	V	I	S	Q	L	L	L	L	1742
ATC	CAG	TCA	TGT	GAG	GTC	ATA	AGC	CAG	TTG	TTG	CTG	CTT	5226
→ EXON 21													
V	F	P	L	S	Q	Q	E	H	T	Y	A	T	1755
GTG	TTC	CCA	TTG	TCC	CAG	CAA	GAA	CAC	ACG	TAT	GCT	ACA	5265
EXON 21 ←   → FRAME SHIFT													
Y	L	Q	S	K	I	V	A	L	P	S	R	W	1768
TAT	CTG	CAA	TCC	AAA	ATT	GTT	G	CC	CTT	CCA	AGC	AGA	5304
EXON 21 ←   → FRAME SHIFT													
L	V	*											1771
TTG	GTG	TGA	cactatcaacaaccgagcctactgccactatgacggggg										5352
agactgctgctcttccacactctcctccaagaaggtcattccatttgctgct													5404
gactgtgacctggatgagtgcacctgccgggaccccaaggcagaagaaaatc													5456
agtaa													5461

FIG. 4I

22/28

PAPP-Ec

nt: SEQ ID NO:15

aa: SEQ ID NO:16

M	M	C	L	K	I	L	R	I	S	L	A	I	13
ATG	ATG	TGC	TTA	AAG	ATC	CTA	AGA	ATA	AGC	CTG	GCG	ATT	39
→ BEGIN PAPP-Ef CLONE													
L	A	G	W	A	L	C	S	A	N	S	E	L	26
TTG	GCT	GGG	TGG	GCA	CTC	TGT	TCT	GCC	AAC	TCT	GAG	CTG	78
→ BEGIN PAPP-Ef CLONE													
G	W	T	R	K	K	S	L	V	E	R	E	H	39
GGC	TGG	ACA	CGC	AAG	AAA	TCC	TTG	GTT	GAG	AGG	GAA	CAC	117
L	N	Q	V	L	L	E	G	E	R	C	W	L	52
CTG	AAT	CAG	GTG	CTG	TTG	GAA	GGA	GAA	CGT	TGT	TGG	CTG	156
G	A	K	V	R	R	P	R	A	S	P	Q	H	65
GGG	GCC	AAG	GTT	CGA	AGA	CCC	AGA	GCT	TCT	CCA	CAG	CAT	195
H	L	F	G	V	Y	P	S	R	A	G	N	Y	78
CAC	CTC	TTT	GGA	GTC	TAC	CCC	AGC	AGG	GCT	GGG	AAC	TAC	234
L	R	P	Y	P	V	G	E	Q	E	I	H	H	91
CTA	AGG	CCC	TAC	CCC	GTG	GGG	GAG	CAA	GAA	ATC	CAT	CAT	273
T	G	R	S	K	P	D	T	E	G	N	A	V	104
ACA	GGA	CGC	AGC	AAA	CCA	GAC	ACT	GAA	GGA	AAT	GCT	GTG	312
S	L	V	P	P	D	L	T	E	N	P	A	G	117
AGC	CTT	GTT	CCC	CCA	GAC	CTG	ACT	GAA	AAT	CCA	GCA	GGA	351
L	R	G	A	V	E	E	P	A	A	P	W	V	130
CTG	AGG	GGT	GCA	GTT	GAA	GAG	CCG	GCT	GCC	CCA	TGG	GTA	390
G	D	S	P	I	G	Q	S	E	L	L	G	D	143
GGG	GAT	AGT	CCT	ATT	GGG	CAA	TCT	GAG	CTG	CTG	GGA	GAT	429
D	D	A	Y	L	G	N	Q	R	S	K	E	S	156
GAT	GAC	GCT	TAT	CTC	GGC	AAT	CAA	AGA	TCC	AAG	GAG	TCT	468
L	G	E	A	G	I	Q	K	G	S	A	M	A	169
CTA	GGT	GAG	GCC	GGG	ATT	CAG	AAA	GGC	TCA	GCC	ATG	GCT	507

FIG. 5A

A	T	T	T	T	A	I	F	T	T	L	N	E	182
GCC	ACT	ACT	ACC	ACC	GCC	ATT	TTC	ACA	ACC	CTG	AAC	GAA	546
P	K	P	E	T	Q	R	R	G	W	A	K	S	195
CCC	AAA	CCA	GAG	ACC	CAA	AGG	AGG	GGC	TGG	GCC	AAG	TCC	585
R	Q	R	R	Q	V	W	K	R	R	A	E	D	208
AGG	CAG	CGT	CGC	CAA	GTG	TGG	AAG	AGG	CGG	GCG	GAA	GAT	624
G	Q	G	D	S	G	I	S	S	H	F	Q	P	221
GGG	CAG	GGA	GAC	TCC	GGT	ATC	TCT	TCA	CAT	TTC	CAA	CCT	663
W	P	K	H	S	L	K	H	G	V	K	K	S	234
TGG	CCC	AAG	CAT	TCC	CTT	AAA	CAC	GGG	GTC	AAA	AAG	AGT	702
P	P	E	E	S	N	Q	N	G	G	E	G	S	247
CCA	CCG	GAG	GAA	AGC	AAC	CAA	AAT	GGT	GGA	GAG	GGC	TCC	741
Y	R	E	A	E	T	F	N	S	Q	V	G	L	260
TAC	CGA	GAA	GCA	GAG	ACC	TTT	AAC	TCC	CAA	GTA	GGA	CTG	780
P	I	L	Y	F	S	G	R	R	E	R	L	L	273
CCC	ATC	TTA	TAC	TTC	TCT	GGG	AGG	CGG	GAG	CGG	CTG	CTG	819
L	R	P	E	V	L	A	E	I	P	R	E	A	286
CTG	CGT	CCA	GAA	GTG	CTG	GCT	GAG	ATT	CCC	CGG	GAG	GCG	858
F	T	V	E	A	W	V	K	P	E	G	G	Q	299
TTC	ACA	GTG	GAA	GCC	TGG	GTT	AAA	CCG	GAG	GGA	GGA	CAG	897
▽ DELETION OF PAPP-Ea aa 308-413													
N	N	P	A	I	I	A	G	G	I	V	L	S	312
AAC	AAC	CCA	GCC	ATC	ATC	GCA	GGT	GGC	ATT	GTC	CTC	AGC	936
Δ DELETION OF PAPP-Ea aa 308-413													
P	A	Y	Y	G	M	P	G	H	T	D	T	M	325
CCA	GCA	TAT	TAT	GGG	ATG	CCT	GGC	CAC	ACC	GAC	ACC	ATG	975
I	H	E	V	G	H	V	L	G	L	Y	H	V	338
ATC	CAT	GAA	GTG	GGA	CAT	GTT	CTG	GGA	CTC	TAC	CAT	GTC	1014
F	K	G	V	S	E	R	E	S	C	N	D	P	351
TTT	AAA	GGA	GTC	AGT	GAA	AGA	GAA	TCC	TGC	AAT	GAC	CCC	1053

FIG. 5B

C	K	E	T	V	P	S	M	E	T	G	D	L	364
TGC	AAG	GAG	ACA	GTG	CCA	TCC	ATG	GAA	ACG	GGA	GAC	CTC	1092
C	A	D	T	A	P	T	P	K	S	E	L	C	377
TGT	GCC	GAC	ACC	GCC	CCC	ACT	CCC	AAG	AGT	GAG	CTG	TGC	1131
R	E	P	E	P	T	S	D	T	C	G	F	T	390
CGG	GAA	CCA	GAG	CCC	ACT	AGT	GAC	ACC	TGT	GGC	TTC	ACT	1170
R	F	P	G	A	P	F	T	N	Y	M	S	Y	403
CGC	TTC	CCA	GGG	GCT	CCG	TTC	ACC	AAC	TAC	ATG	AGC	TAC	1209
T	D	D	N	C	T	D	N	F	T	P	N	Q	416
ACG	GAT	GAT	AAC	TGC	ACT	GAC	AAC	TTC	ACT	CCT	AAC	CAA	1248
V	A	R	M	H	C	Y	L	D	L	V	Y	Q	429
GTG	GCC	CGA	ATG	CAT	TGC	TAT	TTG	GAC	CTA	GTC	TAT	CAG	1287
Q	W	T	E	S	R	K	P	T	P	I	P	I	442
CAG	TGG	ACT	GAA	AGC	AGA	AAG	CCC	ACC	CCC	ATC	CCC	ATT	1326
P	P	M	V	I	G	Q	T	N	K	S	L	T	455
CCA	CCT	ATG	GTC	ATC	GGA	CAG	ACC	AAC	AAG	TCC	CTC	ACT	1365
I	H	W	L	P	P	I	S	G	V	V	Y	D	468
ATC	CAC	TGG	CTG	CCT	CCT	ATT	AGT	GGA	GTT	GTA	TAT	GAC	1404
R	A	S	G	S	L	C	G	A	C	T	E	D	481
AGG	GCC	TCA	GGC	AGC	TTG	TGT	GGC	GCT	TGC	ACT	GAA	GAT	1443
G	T	F	R	Q	Y	V	H	T	A	S	S	R	494
GGG	ACC	TTT	CGT	CAG	TAT	GTG	CAC	ACA	GCT	TCC	TCC	CGG	1482
R	V	C	D	S	S	G	Y	W	T	P	E	E	507
CGG	GTG	TGT	GAC	TCC	TCA	GGT	TAT	TGG	ACC	CCA	GAG	GAG	1521
A	V	G	P	P	D	V	D	Q	P	C	E	P	520
GCT	GTG	GGG	CCT	CCT	GAT	GTG	GAT	CAG	CCC	TGC	GAG	CCA	1560
S	L	Q	A	W	S	P	E	V	H	L	Y	H	533
AGC	TTA	CAG	GCC	TGG	AGC	CCT	GAG	GTC	CAC	CTG	TAC	CAC	1599
M	N	M	T	V	P	C	P	T	E	G	C	S	546
ATG	AAC	ATG	ACG	GTC	CCC	TGC	CCC	ACA	GAA	GGC	TGT	AGC	1638
L	E	L	L	F	Q	H	P	V	Q	A	D	T	559
TTG	GAG	CTG	CTC	TTC	CAA	CAC	CCG	GTC	CAA	GCC	GAC	ACC	1677

FIG. 5C



L	T	L	W	V	T	S	F	F	M	E	S	S	572
CTC	ACC	CTG	TGG	GTC	ACT	TCC	TTC	TTC	ATG	GAG	TCC	TCG	1716
Q	V	L	F	D	T	E	I	L	L	E	N	K	585
CAG	GTC	CTC	TTT	GAC	ACA	GAG	ATC	TTG	CTG	GAA	AAC	AAG	1755
E	S	V	H	L	G	P	L	D	T	F	C	D	598
GAG	TCA	GTG	CAC	CTG	GGC	CCC	TTA	GAC	ACT	TTC	TGT	GAC	1794
I	P	L	T	I	K	L	H	V	D	G	K	V	611
ATC	CCA	CTC	ACC	ATC	AAA	CTG	CAC	GTG	GAT	GGG	AAG	GTG	1833
S	G	V	K	V	Y	T	F	D	E	R	I	E	624
TCG	GGG	GTG	AAA	GTC	TAC	ACC	TTT	GAT	GAG	AGG	ATA	GAG	1872
I	D	A	A	L	L	T	S	Q	P	H	S	P	637
ATT	GAT	GCA	GCA	CTC	CTG	ACT	TCT	CAG	CCC	CAC	AGT	CCC	1911
L	C	S	G	C	R	P	V	R	Y	Q	V	L	650
TTG	TGC	TCT	GGC	TGC	AGG	CCT	GTG	AGG	TAC	CAG	GTT	CTC	1950
R	D	P	P	F	A	S	G	L	P	V	V	V	663
CGC	GAT	CCC	CCA	TTT	GCC	AGT	GGT	TTG	CCC	GTG	GTG	GTG	1989
T	H	S	H	R	K	F	T	D	V	E	V	T	676
ACA	CAT	TCT	CAC	AGG	AAG	TTC	ACG	GAC	GTG	GAG	GTC	ACA	2028
P	G	Q	M	Y	Q	Y	Q	V	L	A	E	A	689
CCT	GGA	CAG	ATG	TAT	CAG	TAC	CAA	GTT	CTA	GCT	GAA	GCT	2067
G	G	E	L	G	E	A	S	P	P	L	N	H	702
GGA	GGA	GAA	CTG	GGA	GAA	GCT	TCG	CCT	CCT	CTG	AAC	CAC	2106
I	H	G	A	P	Y	C	G	D	G	K	V	S	715
ATT	CAT	GGA	GCT	CCT	TAT	TGT	GGA	GAT	GGG	AAG	GTG	TCA	2145
E	R	L	G	E	E	C	D	D	G	D	L	V	728
GAG	AGA	CTG	GGA	GAA	GAG	TGT	GAT	GAT	GGA	GAC	CTT	GTG	2184
S	G	D	G	C	S	K	V	C	E	L	E	E	741
AGC	GGA	GAT	GGC	TGC	TCC	AAG	GTG	TGT	GAG	CTG	GAG	GAA	2223
G	F	N	C	V	G	E	P	S	L	C	Y	M	754
GGT	TTC	AAC	TGT	GTA	GGA	GAG	CCA	AGC	CTT	TGC	TAC	ATG	2262
Y	E	G	D	G	I	C	E	P	F	E	R	K	767
TAT	GAG	GGA	GAT	GGC	ATA	TGT	GAA	CCT	TTT	GAG	AGA	AAA	2301

FIG. 5D

T	S	I	V	D	C	G	I	Y	T	P	K	G	780
ACC	AGC	ATT	GTA	GAC	TGT	GGC	ATC	TAC	ACT	CCC	AAA	GGA	2340
Y	L	D	Q	W	A	T	R	A	Y	S	S	H	793
TAC	TTG	GAT	CAA	TGG	GCT	ACC	CGG	GCT	TAC	TCC	TCT	CAT	2379
E	D	K	K	K	C	P	V	S	L	V	T	G	806
GAA	GAC	AAG	AAG	AAG	TGT	CCT	GTT	TCC	TTG	GTA	ACT	GGA	2418
E	P	H	S	L	I	R	T	S	Y	H	P	D	819
GAA	CCT	CAT	TCC	CTA	ATT	CGC	ACA	TCA	TAC	CAT	CCA	GAT	2457
L	P	N	H	R	P	L	T	G	W	F	P	C	832
TTA	CCC	AAC	CAC	CGT	CCC	CTA	ACT	GGC	TGG	TTT	CCC	TGT	2496
V	A	S	E	N	E	T	Q	D	D	R	S	E	845
GTT	GCC	AGT	GAA	AAT	GAA	ACT	CAG	GAT	GAC	AGG	AGT	GAA	2535
Q	P	E	G	S	L	K	K	E	D	E	V	W	858
CAG	CCA	GAA	GGT	AGC	CTG	AAG	AAA	GAG	GAT	GAG	GTT	TGG	2574
L	K	V	C	F	N	R	P	G	E	A	R	A	871
CTC	AAA	GTG	TGT	TTC	AAT	AGA	CCA	GGA	GAG	GCC	AGA	GCA	2613
I	F	I	F	L	T	T	D	G	L	V	P	G	884
ATT	TTT	ATT	TTT	TTG	ACA	ACT	GAT	GGC	CTA	GTT	CCC	GGA	2652
E	H	O	O	P	T	V	T	L	Y	L	T	D	897
GAG	CAT	CAG	CAG	CCG	ACA	GTG	ACT	CTC	TAC	CTG	ACC	GAT	2691
V	R	G	S	N	H	S	L	G	T	Y	G	L	910
GTC	CGT	GGA	AGC	AAC	CAC	TCT	CTT	GGA	ACC	TAT	GGA	CTG	2730
S	C	O	H	N	P	L	I	I	N	V	T	H	923
TCA	TGC	CAG	CAC	AAT	CCA	CTG	ATT	ATC	AAT	GTG	ACC	CAT	2769
H	O	N	V	L	F	R	H	T	T	S	V	L	936
CAC	CAG	AAT	GTC	CTT	TTC	CGC	CAT	ACC	ACC	TCA	GTG	CTG	2808
L	N	F	S	S	P	R	V	G	I	S	A	V	949
CTG	AAT	TTC	TCA	TCC	CCA	CGG	GTC	GGC	ATC	TCA	GCT	GTG	2847
A	L	R	T	S	S	R	I	G	L	S	A	P	962
GCT	CTA	AGG	ACA	TCC	TCC	CGC	ATT	GGT	CTC	TCG	GCT	CCC	2886
S	N	C	I	S	E	D	E	G	Q	N	H	Q	975
AGT	AAC	TGC	ATC	TCA	GAG	GAC	GAG	GGG	CAG	AAT	CAT	CAG	2925

FIG. 5E

G	Q	S	C	I	H	R	P	C	G	K	Q	D	988
GGA	CAG	AGC	TGT	ATC	CAT	CGG	CCC	TGT	GGG	AAG	CAG	GAC	2964
S	C	P	S	L	L	L	D	H	A	D	V	V	1001
AGC	TGT	CCG	TCA	TTG	CTG	CTT	GAT	CAT	GCT	GAT	GTG	GTG	3003
N	C	T	S	I	G	P	G	L	M	K	C	A	1014
AAC	TGT	ACC	TCT	ATA	GGC	CCA	GGT	CTC	ATG	AAG	TGT	GCT	3042
T	T	C	Q	R	G	F	A	L	Q	A	S	S	1027
ACC	ACT	TGT	CAA	AGG	GGA	TTT	GCC	CTT	CAG	GCC	AGC	AGT	3081
E	Q	Y	I	R	L	M	Q	K	E	I	L	L	1040
GAG	CAG	TAC	ATC	AGG	CTC	ATG	CAG	AAG	GAG	ATT	CTG	CTC	3120
T	C	S	S	G	H	W	D	Q	N	V	S	C	1053
ACA	TGT	TCT	TCT	GGG	CAC	TGG	GAC	CAG	AAT	GTG	AGC	TGC	3159
L	P	V	D	C	G	V	P	D	P	S	L	V	1066
CTT	CCC	GTG	GAC	TGC	GGT	GTT	CCC	GAC	CCG	TCT	TTG	GTG	3198
N	Y	A	N	F	S	C	S	E	G	T	K	F	1079
AAC	TAT	GCA	AAC	TTC	TCC	TGC	TCA	GAG	GGA	ACC	AAA	TTT	3237
L	K	R	C	S	I	S	C	V	P	P	A	K	1092
CTG	AAA	CGC	TGC	TCA	ATC	TCT	TGT	GTC	CCA	CCA	GCC	AAG	3276
L	Q	G	L	S	P	W	L	T	C	L	E	D	1105
CTG	CAA	GGA	CTG	AGC	CCA	TGG	CTG	ACA	TGT	CTT	GAA	GAT	3315
G	L	W	S	L	P	E	V	Y	C	K	L	E	1118
GGT	CTC	TGG	TCT	CTC	CCT	GAA	GTC	TAC	TGC	AAG	TTG	GAG	3354
C	D	A	P	P	I	I	L	N	A	N	L	L	1131
TGT	GAT	GCT	CCC	CCT	ATT	ATT	CTG	AAT	GCC	AAC	TTG	CTC	3393
L	P	H	C	L	Q	D	N	H	D	V	G	T	1144
CTG	CCT	CAC	TGC	CTC	CAG	GAC	AAC	CAC	GAC	GTG	GGC	ACC	3432
I	C	K	Y	E	C	K	P	G	Y	Y	V	A	1157
ATC	TGC	AAA	TAT	GAA	TGC	AAA	CCA	GGG	TAC	TAT	GTG	GCA	3471
E	S	A	E	G	K	V	R	N	K	L	L	K	1170
GAA	AGT	GCA	GAG	GGT	AAA	GTC	AGG	AAC	AAG	CTC	CTG	AAG	3510
I	Q	C	L	E	G	G	I	W	E	Q	G	S	1183
ATA	CAA	TGC	CTG	GAA	GGT	GGA	ATC	TGG	GAG	CAA	GGC	AGC	3549

FIG. 5F

C	I	P	V	V	C	E	P	P	P	P	V	F	1196
TGC	ATT	CCT	GTG	GTG	TGT	GAG	CCA	CCC	CCT	CCT	GTG	TTT	3588
E	G	M	Y	E	C	T	N	G	F	S	L	D	1209
GAA	GGC	ATG	TAT	GAA	TGT	ACC	AAT	GGC	TTC	AGC	CTG	GAC	3627
S	Q	C	V	L	N	C	N	Q	E	R	E	K	1222
AGC	CAG	TGT	GTG	CTC	AAC	TGT	AAC	CAG	GAA	CGT	GAA	AAG	3666
L	P	I	L	C	T	K	E	G	L	W	T	Q	1235
CTT	CCC	ATC	CTC	TGC	ACT	AAA	GAG	GGC	CTG	TGG	ACC	CAG	3705
E	F	K	L	C	E	N	L	Q	G	E	C	P	1248
GAG	TTT	AAG	TTG	TGT	GAG	AAT	CTG	CAA	GGA	GAA	TGC	CCG	3744
P	P	P	S	E	L	N	S	V	E	Y	K	C	1261
CCA	CCC	CCC	TCA	GAG	CTG	AAT	TCT	GTG	GAG	TAC	AAA	TGT	3783
E	Q	G	Y	G	I	G	A	V	C	S	P	L	1274
GAA	CAA	GGA	TAT	GGG	ATT	GGT	GCA	GTG	TGT	TCC	CCA	TTG	3822
C	V	I	P	P	S	D	P	V	M	L	P	E	1287
TGT	GTA	ATC	CCC	CCC	AGT	GAC	CCC	GTG	ATG	CTA	CCT	GAG	3861
N	I	T	A	D	T	L	E	H	W	M	E	P	1300
AAT	ATC	ACT	GCT	GAC	ACT	CTG	GAG	CAC	TGG	ATG	GAA	CCT	3900
V	K	V	Q	S	I	V	C	T	G	R	R	Q	1313
GTC	AAA	GTC	CAG	AGC	ATT	GTG	TGC	ACT	GGC	CGG	CGT	CAA	3939
W	H	P	D	P	V	L	V	H	C	I	Q	S	1326
TGG	CAC	CCA	GAC	CCC	GTC	TTA	GTC	CAC	TGC	ATC	CAG	TCA	3978
C	E	P	F	Q	A	D	G	W	C	D	T	I	1339
TGT	GAG	CCC	TTC	CAA	GCA	GAT	GGT	TGG	TGT	GAC	ACT	ATC	4017
N	N	R	A	Y	C	H	Y	D	G	G	D	C	1352
AAC	AAC	CGA	GCC	TAC	TGC	CAC	TAT	GAC	GGG	GGA	GAC	TGC	4056
C	S	S	T	L	S	S	K	K	V	I	P	F	1365
TGC	TCT	TCC	ACA	CTC	TCC	TCC	AAG	AAG	GTC	ATT	CCA	TTT	4095
A	A	D	C	D	L	D	E	C	T	C	R	D	1378
GCT	GCT	GAC	TGT	GAC	CTG	GAT	GAG	TGC	ACC	TGC	CGG	GAC	4134
P	K	A	E	E	N	O	*						1386
CCC	AAG	GCA	GAA	GAA	AAT	CAG	TAA						4158

FIG. 5G